7.2 **SOLUTIONS FOR SEED TREATMENT (LS)**

Note for preparation of draft specifications. Do not omit clauses or insert additional clauses, nor insert limits that are more lax than those than given in the guidelines, without referring to section 4. From the “Notes” provided at the end of this guideline, incorporate only those which are applicable to the particular specification.

The guidelines for seed treatment formulations do not apply to formulations intended for film-coating or pelleting of seeds. They include special clauses, related to their use pattern, although some of the corresponding test methods are not yet developed. The influence of treatment on germination is of major importance but it is not the subject of a specification clause because no test method is applicable to all types of seeds. To avoid adverse effects, users should apply the formulation strictly according to the recommendations of the manufacturer and should not treat seeds for which effect on germination is not known. Treated seeds should be stored in a suitable container and should be protected from excessive temperature and moisture.

**…… [ISO common name] SOLUTION FOR SEED TREATMENT** (Note 1)

[CIPAC number]/LS (month & year of publication)

7.2.1 **Description**

The material shall consist of technical ...... [ISO common name], complying with the requirements of FAO/WHO specification ......, in the form of ....... (see Section 4.2), dissolved in suitable solvents, together with any other necessary formulants, including colouring matter (Note 1). It shall be in the form of a clear or opalescent liquid, free from visible suspended matter and sediment.

7.2.2 **Active ingredient**

7.2.2.1 **Identity tests** (Note 2)

 The active ingredient shall comply with an identity test and, where the identity remains in doubt, shall comply with at least one additional test.

7.2.2.2 **...... [ISO common name] content** (Note 2)

 The ...... [ISO common name] content shall be declared (g/kg or g/l at 20 ± 2 ºC, Note 3) and, when determined, the average content measured shall not differ from that declared by more than the appropriate tolerance, given in the table of tolerances, Section 4.3.2.

7.2.3 **Relevant impurities**

7.2.3.1 **By-products of manufacture or storage** (Note 4), if required

 Maximum: ......% of the …… [ISO common name] content found under 7.2.2.2.

7.2.3.2 **Water** (MT 30.5) (Notes 5 & 6), if required

 Maximum: ...... g/kg.

7.2.4 **Physical properties**

 7.2.4.1 **Acidity** and/or **Alkalinity** (MT 191) or **pH range** (MT 75.3) (Note 6), if required

 Maximum acidity: ...... g/kg calculated as H2SO4.

 Maximum alkalinity: ...... g/kg calculated as NaOH.

 pH range: ...... to ......

7.2.4.2 **Solution stability** (MT 41.1)

 The formulation, following dilution (Note 7) with CIPAC standard water D and standing at 30 ± 2 °C for 24 h, shall give a clear or opalescent solution, free from more than a trace of sediment and visible solid particles. Any visible sediment or particles produced shall pass through a 75 µm test sieve.

7.2.4.3 **Adhesion to seeds** (MT 194)

 The manufacturer shall declare for a representative type of seeds for which the seed treatment formulation is recommended, the minimum percentage of the [ISO common name] remaining on the seeds after the test.

7.2.5 **Storage stability**

7.2.5.1 **Stability at 0 °C** (MT 39.3)

 After storage at 0 ± 2 °C for 7 days, the volume of solid and/or liquid which separates shall not be more than 0.3 ml.

7.2.5.2 **Stability at elevated temperature** (MT 46.3)

 After storage at 54 ± 2 °C for 14 days (Note 8) the determined average active ingredient content must not be lower than ......% relative to the determined average content found before storage (Note 9) and the formulation shall continue to comply with the clauses for:

- by-products of manufacture or storage (7.2.3.1),

- acidity/alkalinity/pH range (7.2.4.1),

- solution stability (7.2.4.2),

- adhesion to seeds (7.2.4.3),

as required.

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Note 1 The influence of treatment on germination is of major importance but it is not the subject of a specification clause because no test method is applicable to all types of seeds. To avoid adverse effects, users should apply the formulation strictly according to the recommendations of the manufacturer and should not treat seeds for which effect on germination is not known. Treated seeds should be stored in a suitable container and should be protected from excessive temperature and moisture.

 The formulation is expected to contain a dye that permanently colours the seed after treatment (red is recommended) and cannot be removed by washing with water. In some countries, there may be a legal requirement that a specific colour shall be used. The same colour must not be used for denaturing seeds intended for use as livestock feeding stuffs.

Note 2 Method(s) of analysis must be CIPAC, AOAC or equivalent. If the methods have not yet been published then full details, with appropriate method validation data, must be submitted to FAO/WHO by the proposer.

Note 3 If the buyer requires both g/kg and g/l at 20 °C, then in case of dispute the analytical results shall be calculated as g/kg.

Note 4 This clause should include only relevant impurities and the title should be changed to reflect the name of the relevant impurity. Method(s) of analysis must be peer validated.

Note 5 Only for non-aqueous solutions.

Note 6 The method to be used shall be stated. If several methods are available, a referee method shall be selected.

Note 7 The concentration should be within the range of concentrations recommended in the instructions for use. The solution stability test is not applicable for LS which are used without dilution and the clause can be removed.

Note 8 Unless other temperatures and/or times are specified. Refer to Section 4.6.2 of this Manual for alternative storage conditions.

Note 9 Samples of the formulation taken before and after the storage stability test should be analyzed concurrently after the test in order to reduce the analytical error.